Unleashing the Targeted Power of ADCs

2019 Cantor Global Healthcare Conference

October 4, 2019

Legal Disclaimer

This presentation contains “forward-looking” statements within the meaning of federal securities laws. These forward-looking statements are not statements of historical facts and are based on management’s beliefs and assumptions and on information currently available to management. Forward-looking statements include information concerning the Company’s business strategy and the design, progression and timing of its clinical trials.

Forward-looking statements generally can be identified by terms such as “expects,” “anticipates,” “believes,” “could,” “seeks,” “estimates,” “intends,” “may,” “plans,” “potential,” “predicts,” “projects,” “should,” “will,” “would” or similar expressions and the negatives of those terms. The Company’s operations involve risks and uncertainties, many of which are outside its control, and any one of which, or combination of which, could materially affect its results of operations and whether the forward-looking statements ultimately prove to be correct. Factors that may materially affect the Company’s results of operations and whether these forward-looking statements prove to be correct include, among other things, that preclinical testing may not be predictive of the results or success of ongoing or later preclinical or clinical trials, that the development of the Company’s product candidates and new platforms will take longer and/or cost more than planned and that the identification of new product candidates will take longer than planned, as well as those listed in our Annual Report on Form 10-K filed on March 8, 2019, with the Securities and Exchange Commission (“SEC”) and subsequent SEC filings. Except as required by law, the Company assumes no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in the forward-looking statements, even if new information becomes available in the future.

Copies of the Company’s Annual Report on Form 10-K and our other SEC filings are available by visiting EDGAR on the SEC website at http://www.sec.gov.

Building a Leading ADC Oncology Company

XMT-1536

On Track for Near-Term Proof of Concept

- Encouraging Clinical Activity[1]
- Well-Tolerated Profile[1]
- First in Class
- Wholly-Owned[2]
- Fast-to-Market Strategy

Innovative Product Engine

Next IND expected 1H 2020

Designed to Broaden Therapeutic Benefit of ADCs

- DolaLock
  - Dolaflexin
  - Dolasynthen
- Immunosynthen
- Alkymer

Strong Foundation

$128M in Cash[3]

- Runway through at least mid-2021
- Additional $15M credit facility available
- Multiple partnering opportunities (product & platform)

Experienced Leadership Team

BIIB, GENZ, MEDI, MLNM, TSRO, AZN, BAYN, BMY, MRK, RHHBY, TAK

Expertise in:

- Oncology
- ADC Discovery and Development
- Manufacturing

[1] ASCO 2019 Poster #3010; Phase 1 dose escalation study of XMT-1536, a novel NaPi2b-targeting antibody-drug conjugate (ADC), in patients (pts) with solid tumors likely to express NaPi2b; June 2019, Data Cutoff May 10, 2019

[2] Excluding Brazil

[3] Cash, Cash Equivalents, and Marketable Securities as of June 30, 2019

Innovative Product Engine Focused on Clinically Meaningful Cancer Therapies

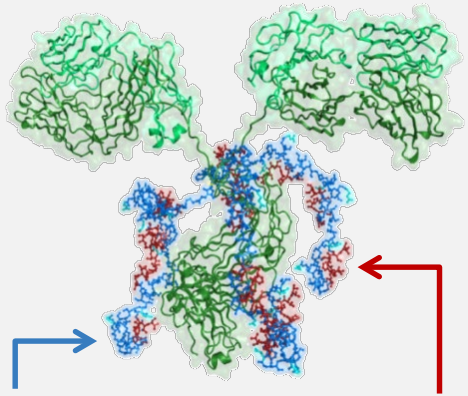
	Target	Discovery	Preclinical Development	Phase 1 Dose Escalation / Expansion	Platform Collaboration
XMT-1536	NaPi2b				
ASN004	5T4				ASANA BioSciences
1H 2020 IND	Undisclosed				
Dolaflexin ADCs	Six Targets Undisclosed				EMD SERONO
Dolaflexin/Dolasynthen ADCs	Multiple Targets Undisclosed				
Immunosynthen ADCs	Multiple Targets Undisclosed				

Novel Dolaflexin Platform Technology

Designed to Expand Therapeutic Index vs. Other ADC Platforms

Fleximer® Polymer

Enables Higher Drug to Antibody Ratio (DAR)



Fleximer Polymer

- Higher DAR
- Optimal PK and drug-like properties
- Efficacy against low antigen expressing tumors

DolaLock Payload

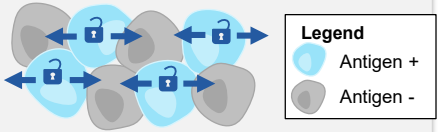
- Highly potent anti-tubulin agent selectively toxic to rapidly dividing cells

DolaLock Payload

Controls Bystander Effect and Systemic Tolerability

Auristatin F-HPA (AF-HPA*)

- Released in target cell
- Cell permeable: capable of antigen-independent bystander killing



Metabolic Conversion in Tumor Cell

Auristatin F (AF)

- Generated intracellularly
- Not cell permeable
- Not a Pgp substrate

*HPA = hydroxypropyl amide

XMT-1536

First-in-Class, Wholly-Owned Dolaflexin ADC Targeting NaPi2b

Mersana THERAPEUTICS

XMT-1536, a Dolaflexin ADC Targeting NaPi2b for Ovarian Cancer and NSCLC Adenocarcinoma

First-in-Class

- Clinically-validated target
- Broadly expressed in OC and NSCLC adenocarcinoma
- Limited expression in healthy tissues
- Wholly-owned[1]

Encouraging Clinical Activity

- Durable responses and stable disease in heavily pretreated and unselected patients
- Expansion cohorts initiated in 36 mg/m^2 in platinum-resistant ovarian cancer and NSCLC adenocarcinoma

Well-Tolerated

- MTD not yet reached
- Dose escalation to 43 mg/m^2 ongoing
- No significant toxicities commonly seen with other ADCs: neutropenia, ocular toxicities, or neuropathy
- Transient AST elevation without associated changes in bilirubin

On Track for Near-Term Proof of Concept with Multiple Data Read Outs Expected Over the Next 6 – 12 Months

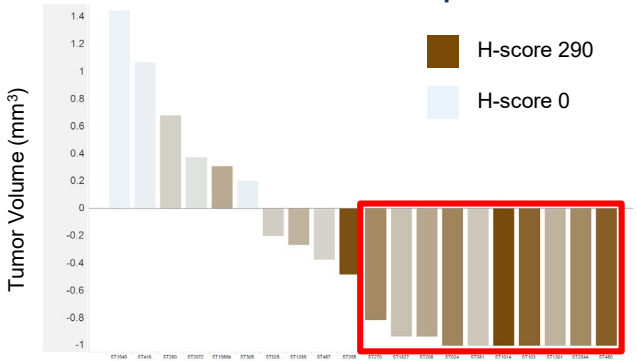
[1] Excluding Brazil

ASCO 2019 Poster #3010; Phase 1 dose escalation study of XMT-1536, a novel NaPi2b-targeting antibody-drug conjugate (ADC), in patients (pts) with solid tumors likely to express NaPi2b; June 2019, Data Cutoff May 10, 2019

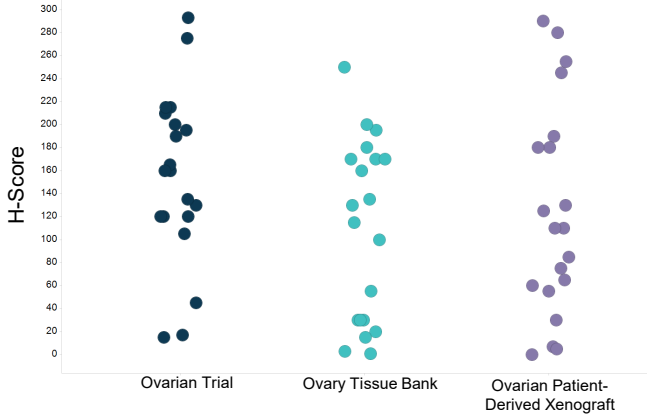
NaPi2b: An Attractive ADC Target Ideally-Suited for Mersana's Innovative Platforms

- Broadly expressed in ovarian cancer and NSCLC adenocarcinoma
  - No detectable expression in squamous NSCLC
  - Limited expression in healthy tissues on apical surface of polarized epithelium (inaccessible to bloodstream limiting potential for on-target toxicities)
- NaPi2b is a lineage marker (not an oncogene) that transports inorganic phosphate (Pi) into the cell
  - Not downregulated in response to treatment
  - High expression of NaPi2b is correlated with the presence of EGFR mutations in NSCLC adenocarcinoma
- Biomarker can distinguish across low, medium, and high expression
  - Correlation between biomarker expression and response in preclinical and clinical settings

In Ovarian PDX Models, only tumors with an H-score above cutoff had a tumor response >50%

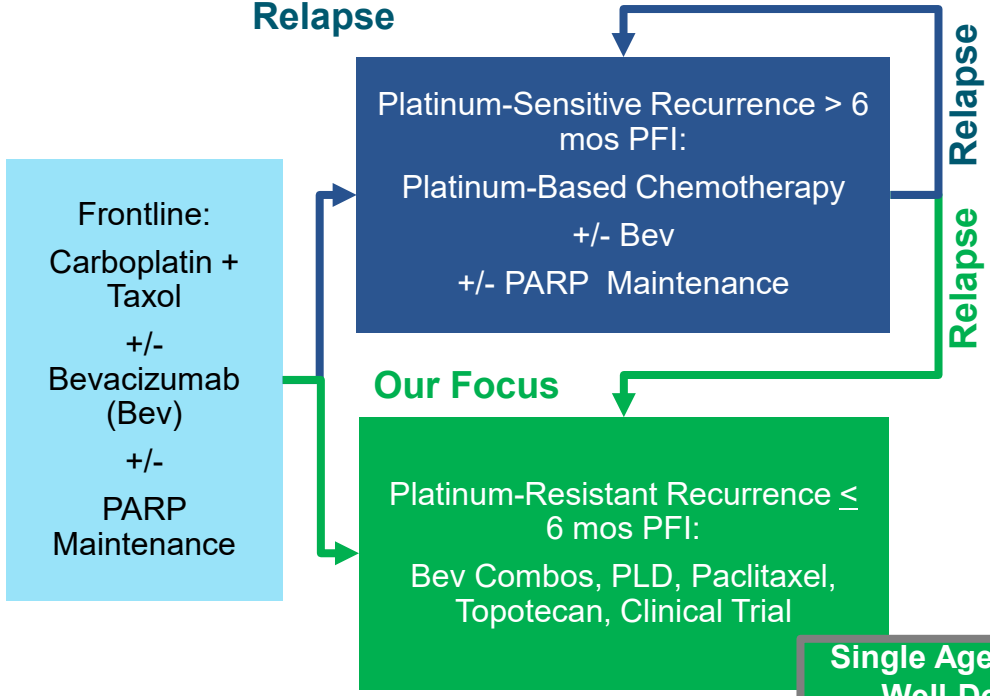


Mersana biomarker discriminates across expression levels



R. Mosher et al, AACR-NCI-EORTC International Conference, October 2017
D'Archangelo, et al. Abstract 194P ESMO 2014
ASCO 2019 Poster #3010; Phase 1 dose escalation study of XMT-1536, a novel NaPi2b-targeting antibody-drug conjugate (ADC), in patients (pts) with solid tumors likely to express NaPi2b; June 2019 , Data Cutoff May 10, 2019

Platinum Resistance is the Final Stage of Advanced Ovarian Cancer for Most Patients



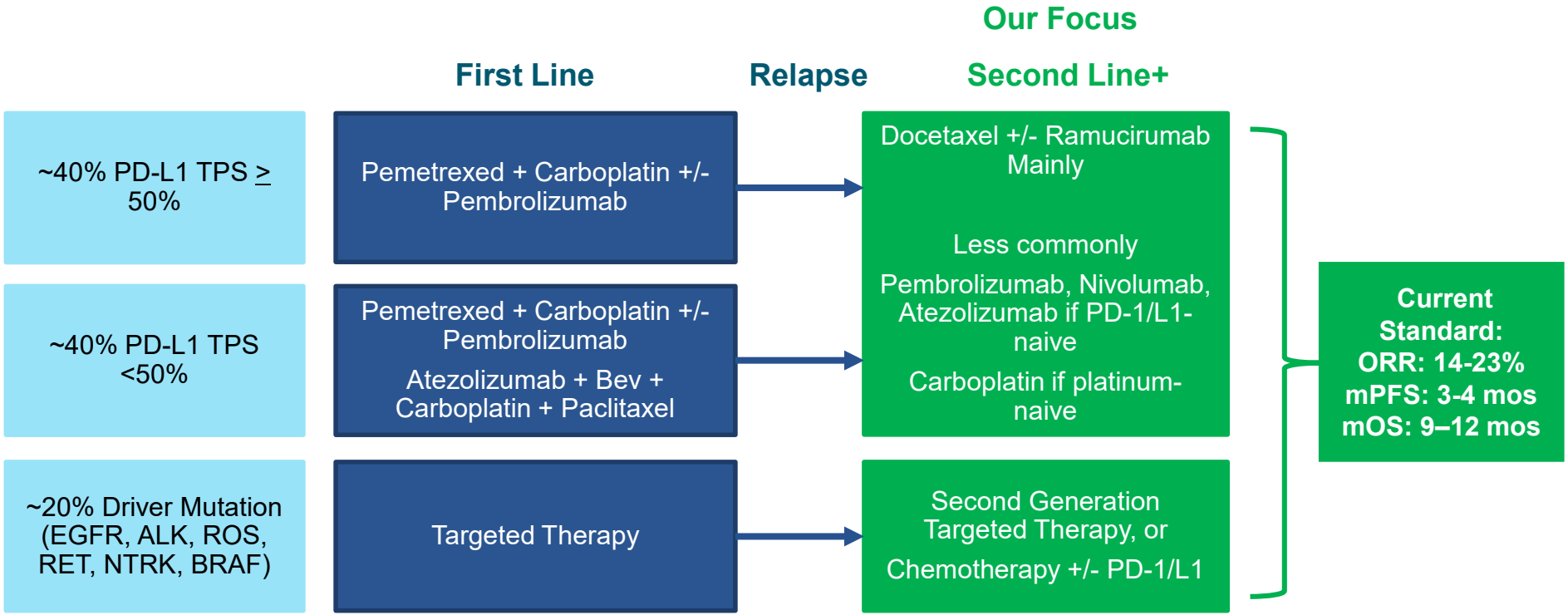
ESMO 2019 Results Expected to Change Standard of Care:

- PARPs shifting to frontline beyond BRCA and potentially in combination with bevacizumab
- In the future, most PROC patients will have seen prior PARP and bevacizumab, increasing unmet need
- Homologous recombinant deficiency (HRD) testing set to increase. HRD negative patients have the highest need

PFI: Platinum-Free Interval; PFS: Progression-free survival; OS: overall survival; ORR: Overall Response Rate; PROC: Platinum-resistant ovarian cancer; Bev: Bevacizumab; PLD: pegylated liposomal doxorubicin; PARP: poly (ADP-ribose) polymerase inhibitor

KOL discussions, Kantar Health

Relapsed NSCLC Adenocarcinoma Patients have Limited Options and Poor Prognosis



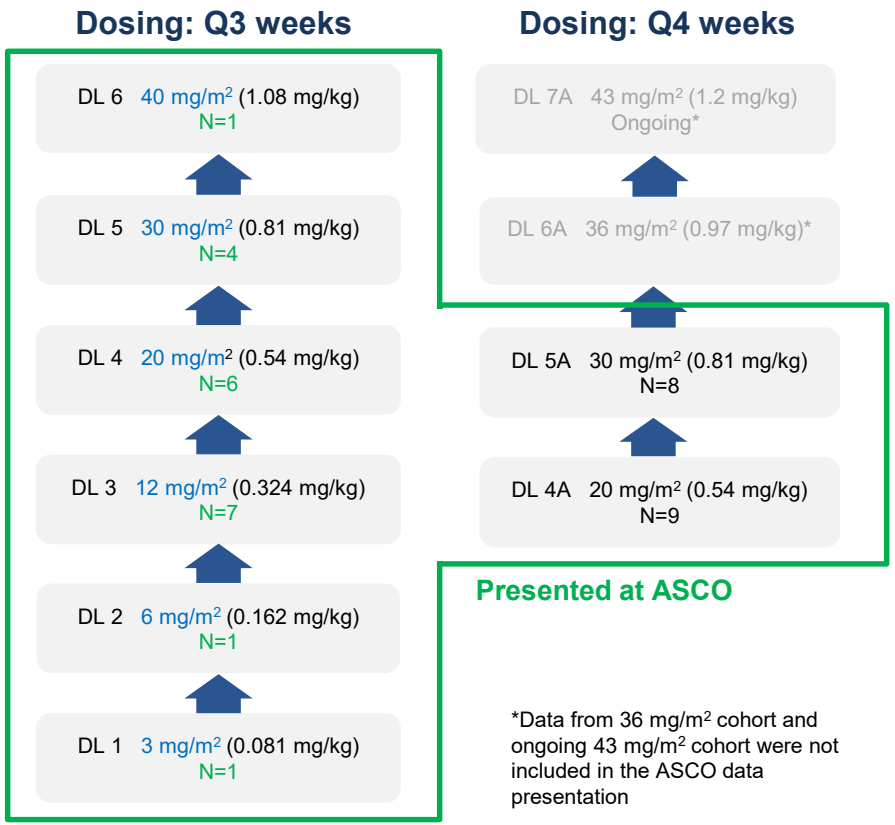
Bev: Bevacizumab

Kantar Health, Smart Oncology Tumor Insights.

XMT-1536 Phase 1 Dose Escalation Study Design

Data Presented at ASCO with a Data Cutoff of May 10, 2019

- **Patient population:** patients with ovarian epithelial, non-squamous lung, endometrial, papillary renal, salivary duct, or papillary thyroid cancers, progressing after standard treatments
- **Dosing:** XMT-1536 administered IV initially every 3 weeks, amended to every 4 weeks, until disease progression or unacceptable toxicity
- **Dose escalation design:** single-patient cohorts for first two dose levels, followed by a standard “3 + 3” design
- **Assessments:** standard assessments including AEs, preliminary activity, concomitant medications, safety labs, PK



ClinicalTrials.gov: NCT03319628

Patients Were Heavily Pretreated and Unselected for NaPi2b

As of May 10, 2019

(N = 37)		
Age (years)	Median (range)	64 (39-93)
Sex – N (%)	Female Male	32 (86) 5 (14)
ECOG performance status – N (%)	0 1	11 (30) 26 (70)
Tumor type – N (%)	Ovarian, fallopian tube, or primary peritoneal NSCLC Endometrial Papillary renal Salivary duct	22 (59) 4 (11) 8 (22) 2 (5) 1 (3)
Prior lines of therapy for metastatic disease (N=37)	Median (range)	4 (1-13)
Prior lines of therapy, ovarian cancer only (N = 22)	Median (range)	5 (1-11)

XMT-1536 was Well-Tolerated with Most AE's Grade 1-2

As of May 10, 2019

Treatment-Related Adverse Events in ≥10% of Patients

N = 37	N (%)			
Preferred Term	**Grade 1**	**Grade 2**	**Grade 3**	**Total**
Nausea	12 (32)	2 (5)	0	14 (38)
Fatigue	4 (11)	7 (19)	0	11 (30)
Headache	5 (14)	5 (14)	0	10 (27)
Aspartate aminotransferase (AST) increased	3 (8)	2 (5)	4 (11)	9 (24)
Decreased appetite	1 (3)	6 (16)	0	7 (19)
Blood alkaline phosphatase increased	6 (16)	0	0	6 (16)
Vomiting	4 (11)	1 (3)	0	5 (14)
Gamma-glutamyltransferase (GGT) increased	3 (8)	1 (3)	0	4 (11)
Myalgia	3 (8)	0	1(3)	4 (11)
Pyrexia	3 (8)	1 (3)	0	4 (11)

Dose Escalation Continues

Safety:

- No Grade 4 or 5 treatment-related adverse events (TRAEs)
- Low rate of toxicities associated with microtubule-targeting agents or other ADC platforms, such as neutropenia, ocular toxicities, or peripheral neuropathy

Response Evaluable Population, Unselected for NaPi2b

As of May 10, 2019

Outcomes in Ovarian Cancer (OC) & Non-small Cell Lung Cancer (NSCLC)	All OC	All NSCLC	OC ≥20 mg/m^2	NSCLC ≥20 mg/m^2	OC ≥30 mg/m^2
N	19	3	16	2	7
PR*	3 (16%)	0 (0%)	3 (19%)	0 (0%)	2 (28%)
SD*	8 (42%)	2 (67%)	6 (38%)	2 (100%)	3 (43%)
DCR (PR + SD)	11 (58%)	2 (67%)	9 (57%)	2 (100%)	5 (71%)
PD*	8 (42%)	1 (33%)	7 (43%)	0 (0%)	2 (28%)

- Based on objective responses and duration of treatment
- Clinical activity was observed at doses of 20 mg/m^2 and higher

*As measured by RECIST, version 1.1

Ovarian Cancer and NSCLC Adenocarcinoma Duration

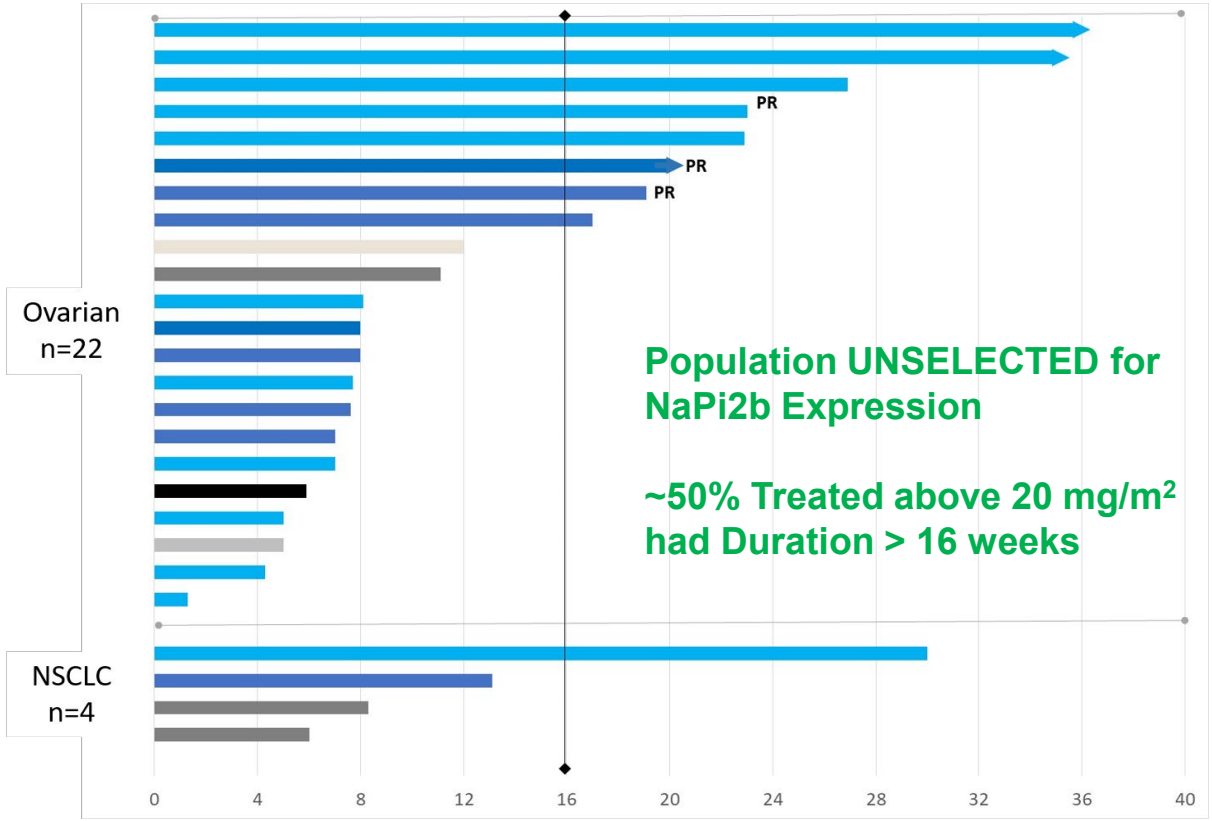
As of May 10, 2019

All Completed Dose Levels
OC and NSCLC Patients, N=26

n=1	3 mg/m^2 Dose Level 1
n=1	6 mg/m^2 Dose Level 2
n=3	12 mg/m^2 Dose Level 3
n=12	20 mg/m^2 Dose Levels 4 & 4A
n=8	30 mg/m^2 Dose Levels 5 & 5A
n=1	40 mg/m^2 Dose Level 6

Ongoing →

Partial Remission = **PR**



XMT-1536 Phase I Expansion Study Initiated

Study Designed to Confirm Profile and Inform Path to Approval in High Unmet Medical Need Populations

Expansion Study Initiated:
36 mg/m^2 dose on Q4W schedule

Expansion: Platinum-Resistant Ovarian Cancer

Eligibility criteria:

- High-grade serous histology
- 1-3 prior lines of therapy
- Platinum-resistant
- Archived tumor and fresh biopsy (if medically feasible)

Expansion: NSCLC Adenocarcinoma

Eligibility criteria:

- Adenocarcinoma histology
- Prior treatment with a platinum doublet and PD-1/L1 inhibitor
- No additional prior treatment with cytotoxics or immunotherapy
- Prior TKIs for patients with targetable abnormalities
- Archived tumor and fresh biopsy (if medically feasible)

Dose Escalation: Continuation

- MTD not determined in dose escalation study
- Exploring 43 mg/m2 dose in parallel to expansion study to inform future clinical development

ADC Platforms

Leveraging Our ADC Platforms to Generate a Differentiated Pipeline of ADCs

Mersana THERAPEUTICS

Using Highly Differentiated ADC Platforms to Create a Pipeline of Clinically Meaningful Candidates

DolaLock Payload

Dolaflexin

- DAR ~10-12
- Controlled heterogeneity
- Fleximer-based scaffold

Dolasynthen

- Precise DAR, 2-24
- Enables fully homogeneous ADCs
- Modular Synthemer scaffold

Alkymer

- Designed to broaden addressable indications
- DNA-alkylating payload – broad applicability to many tumor types

Immunosynthen

- Designed for systemic administration and tolerability
- Targeted, localized stimulation of the immune system

Proprietary platforms to address broad unmet patient needs

Key 2019 Milestones and 2020 Priorities

2019 Milestones and Accomplishments	
XMT-1536	Reported interim Phase 1 dose escalation data in as ASCO in Q2 2019 ✓ Selected dose and initiated expansion portion of the Phase 1 study in Q3 2019 ✓ Present data on NaPi2b expression in NSCLC in Q4 2019
ADC Candidate	Disclose next ADC candidate around year end
R&D	Presented Dolasynthen ADC platform preclinical data at AACR in Q1 2019 ✓ Present Immunosynthen ADC platform preclinical data in Q4 2019
Corporate	Proactively evaluate potential for strategic collaborations that maximize value
2020 Priorities	
XMT-1536	Complete dose escalation and report data Report data from PROC expansion cohort Report data from NSCLC adenocarcinoma expansion cohort
ADC Candidate	File IND in 1H 2020
R&D	Continue to advance R&D pipeline (Immunosynthen, Dolaflexin, Dolasynthen)

Positioned to Create Value for Patients and Shareholders

XMT-1536

- First-in-class molecule addressing significant unmet medical needs
- Reported encouraging clinical activity and tolerability from Phase 1 dose escalation study[1]
- On track for near-term proof of concept with multiple data read outs expected over the next 6 – 12 months

R&D

- Next IND on track for 1H 2020
- Advancing four differentiated, proprietary ADC platforms designed to broaden our pipeline and enhance the therapeutic benefit of our ADC candidates

Corporate

- $128M in cash as of June 30, 2019 provides runway through at least mid-2021; additional $15M credit facility available
- Wholly-owned assets (product candidates & platforms) provide multiple partner opportunities

[1] ASCO 2019 Poster #3010; Phase 1 dose escalation study of XMT-1536, a novel NaPi2b-targeting antibody-drug conjugate (ADC), in patients (pts) with solid tumors likely to express

Unleashing the Targeted Power of ADCs